

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

Methodology for calculating potential impacts of SWANCC v. USACOE on the extent of Indiana's water resources

Contact James Robb at jrobb@dem.state.in.us 317-233-8802 with any questions or comments.

Scenario 1: Connection to stream (within positional accuracy of data)

Step 1. Panel your National Wetland Inventory (NWI) or State digital wetland vector data into a coverage.

Step 2. Dissolve all common wetland and deepwater boundaries. This will convert wetland and deepwater complexes into wetland/deepwater units.

Step 3. Intersect the wetland coverage with a hydrology coverage. Note that the hydrology coverage may contain isolated water bodies such as lakes with no apparent outlet. These need to be removed from the hydrology coverage before intersection. One method of doing this is to remove all "L" designated reaches. Those water bodies that are connected will be added back in through the buffered intersection. Take into account the positional accuracy of the base data used when intersecting by assuming that polygons within the positional accuracy measure of the hydrology coverage are intersected by that coverage.

Step 4: Select those polygons that either intersect, or fall within the positional accuracy buffer of a state line, or US boundary.

Step 5: Select those polygons that fall within the positional accuracy buffer of the previously selected polygons. Repeat until no new polygons are selected. This should overcome the majority of any erroneously separated polygons.

Step 6: The remaining unselected units are potentially isolated wetlands/deepwater units. The selected units are potentially non-isolated.

Step 7: Sum the wetland acreage for both isolated and non-isolated wetlands. Sum the number of isolated and non-isolated wetland units.

Note: Identify your source of wetlands (i.e. National Wetlands Inventory or State Wetlands Inventory). Identify your hydrology layer (i.e. USGS 1:100,000 or 1:24,000 hydrology layer, National Hydrography Dataset (NHD) at 1:100,000 or 1:24,000, or State Hydrology layer). Buffer 1:100,000 scale hydrology data by 50 meters and buffer 1:24,000 data by 12 meters. Identify the width of the buffers used.

Scenario 2: Proximity to connected waters

Following step 5 above, select all units that lie within 100-m of the previously selected units. Repeat remaining steps. Repeat with a 500-m buffer and 1,000- m buffer.

Scenario 3: Exclusion of intermittent/ephemeral streams as connections

Remove all intermittent and ephemeral streams from the hydrologic coverage before implementing step 3 above. Repeat the remaining steps

Scenario 4: Inclusion of floodplain as a connection

Following step 4 above, select all units that are intersected by (within the positional accuracy of) the 100-year floodplain as described by FEMA. Repeat remaining steps. If data exists repeat for the 25-year or 50-year floodplains.

Scenario 5: Inclusion of federal lands as a connection

Following step 4 above, select all units that are intersected by (within the positional accuracy of) federal lands. Repeat remaining steps.

Scenario 6: Presumption of groundwater connection unless impermeable soil present

Following step 4 above, select all units that are intersected by (within the positional accuracy of) NRCS soil polygons with high or moderate infiltration rates. Repeat remaining steps.

Scenario 7: Estimation of otherwise isolated waters that likely have groundwater connections

If the data exists, and it is appropriate to do so given limitations of the data, use digital elevation models, and well data to determine which of the otherwise isolated units likely come into contact with ground water. Consider using the methods described by: Gerla, Philip J. 1999. Estimating the Ground-Water contribution in Wetlands using Modeling and Digital Terrain Analysis. Wetlands. 19(2): 394-402.

Estimating Isolated Waters Using GIS

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Topics of Discussion



- Unanswered questions from SWANCC
- Scenarios
- What data is available for these estimates?
- Indiana's estimates

Unanswered Questions From SWANCC



- What does *navigable* mean?
- What is a *tributary*?
- How do you define *adjacent*?
- What is a *significant nexus*?
- What about other interstate commerce links?

Scenarios



- Worked with the NWI-Center and USEPA to develop likely scenarios
- Seven scenarios include:
 - **Proximity to connected waters**
 - **With and without intermittent/ephemeral streams**
 - **Inclusion of floodplain as a connection**
 - **Estimation of groundwater connections from soil data**

What Data Is Available for These Estimates?



- Reach3 stream reach data
 - | [Http://www.epa.gov/owow/monitoring/rf/refs.html](http://www.epa.gov/owow/monitoring/rf/refs.html)
- National Hydrography Dataset
 - | Replaces reach3
 - | [Http://nhd.usgs.gov/](http://nhd.usgs.gov/)
- National wetland inventory:
 - | <http://enterprise.nwi.fws.gov/index.html>
- SSURGO soil database:
 - | http://www.ftw.nrcs.usda.gov/ssur_data.html

Assumptions



- Contiguous NWI polygons represent a single water unit
- Navigable means navigable-in-fact
- Tributary means streams mapped in the USEPA reach system
- Adjacency means some linear distance from a connected water
- Significant nexus and other commerce links not addressed

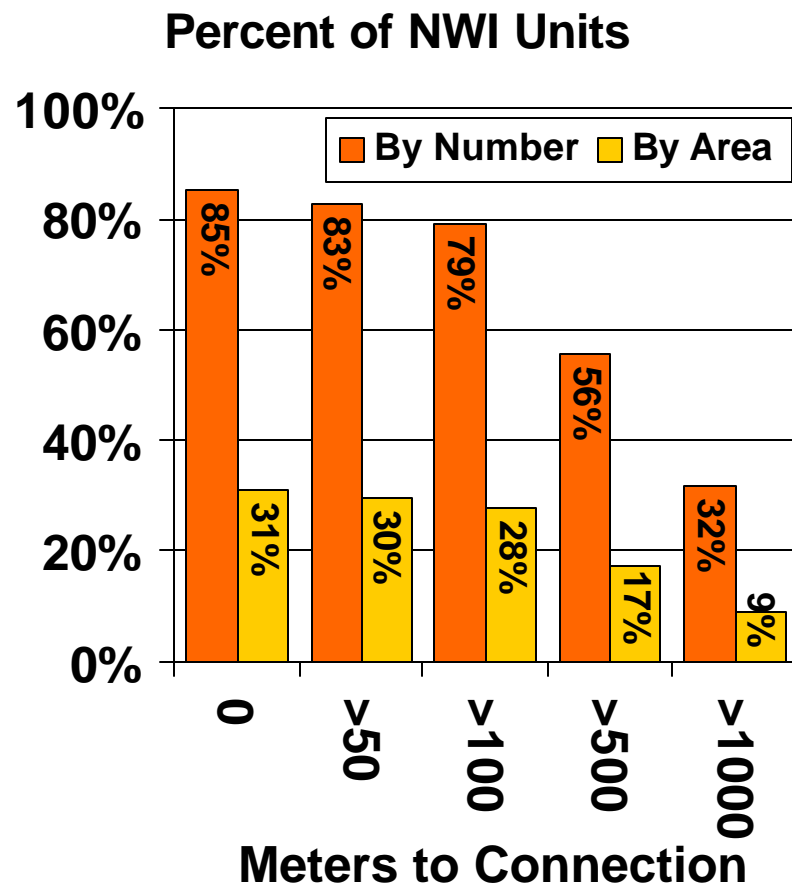
Data Used and Positional Accuracy



- Features that fell within the positional accuracy of each other were considered to touch each other
 - 1:100,000 scale = 50.8 meters
 - | Reach3 (USEPA/USGS)
 - | State line coverage
 - 1:24,000 scale = 12.2 meters
 - | National Wetland Inventory (USFWS)

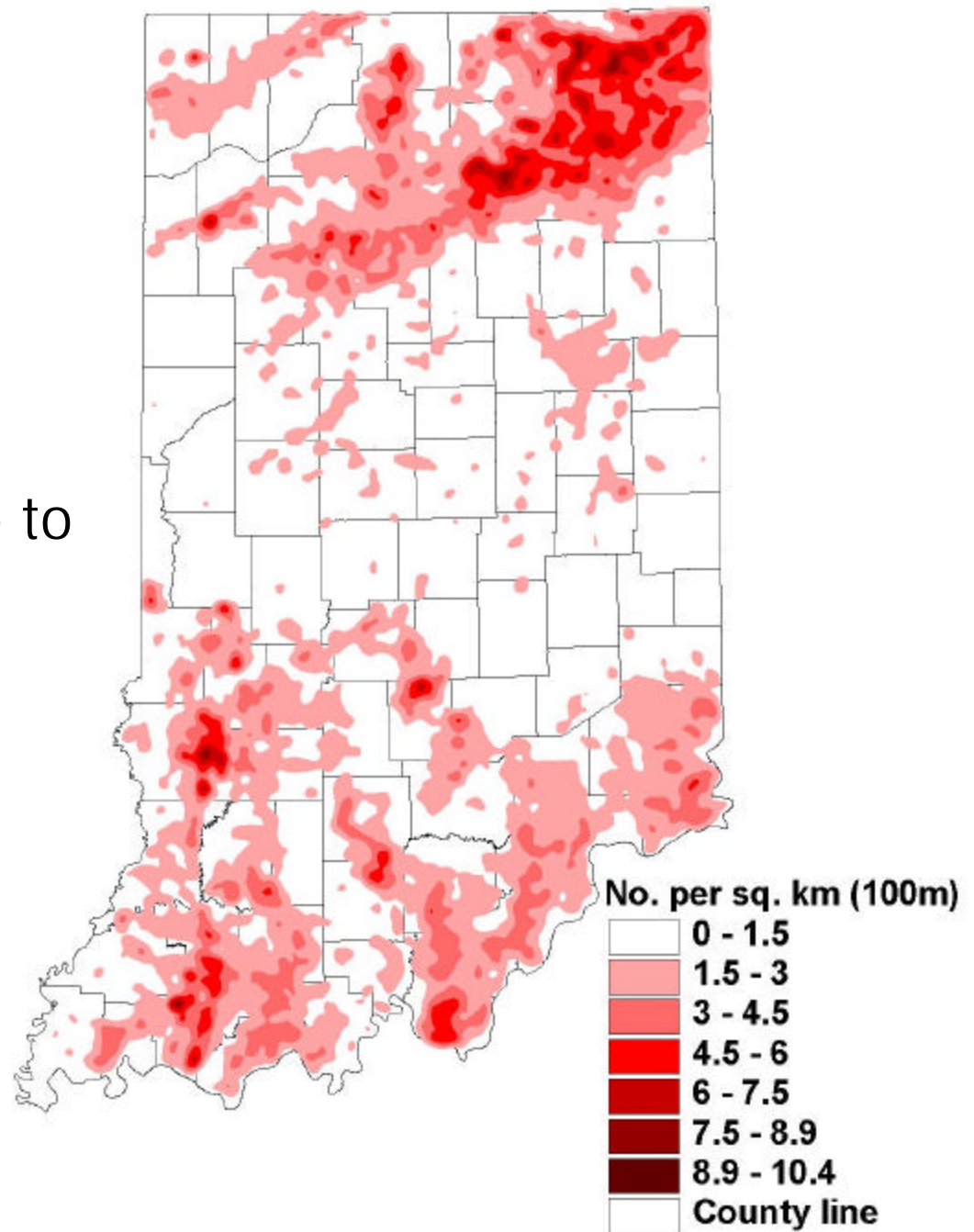
Results

- Disparity between *number* and *area* due to size
- Loss of 85% of the total number of wetland units may be even more important from a biodiversity standpoint than loss of 31% of wetland area



Density

- Isolated waters are not evenly distributed
- South cluster likely due to coal mining and karst geology
- North cluster due to
 - Higher densities of wetlands
 - Glacial topography -- kettles, potholes
 - Lake dunes



Conclusions



- Effects of SWANCC will depend on
 - Federal interpretation
 - States' reactions
- Significant numbers (85%) and area (31%) of Indiana's waters could be removed from federal jurisdiction

More Info



- James Robb, Indiana Dept. of Environmental Management

- <http://www.in.gov/idem/water/planbr/401/401home.html>

- 317-233-8802

- Association of State Wetland Managers' web site <http://www.aswm.org>

- An isolated wetland bibliography:
<http://www.aswm.org/science/isolated.htm>

- An analysis of the SWANCC decision by Jon Kusler:
<http://www.aswm.org/swancc/index.htm>